DICTION, DIGITS AND UNITS IN SCIENTIFIC PAPERS

by

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The purpose of a scientific paper is to convey accurately and concisely new-found information or review critically information that is already available. The reader target should determine the diction, digits, and units of the paper.

Readers fall into the following broad classes :

1 specialists ;

2 non specialists ;

3 practical users of scientific information ;

4 research sponsors ; and

5 the lay public

Specialists

If the paper is directed to specialists, the jargon of the discipline is acceptable. Often the jargon of the field is precise and saves words without sacrificing accuracy, although most editors frown on the use of unorthodox terms. But any plant scientist knows what "photosynthate" is. Compare this word with "the products of photosynthesis". Or "Fine loamy mixed hyperthermic udic plinthustalf" is far more informative that "Brown earth". The principle applies to abbreviations, digits, and units as well. Recognized abbreviations such as pH for the negative logarithm of the hydrogen ion activity, Eh for oxidation-reduction potential, or CEC for cation exchange capacity, apart from saving space, hit the mind more forcefully than the longer expressions. The number of digits is conditioned by the precision and accuracy of the determination.

The periodic table states that the atomic weight of hydrogen is 1,008 and that uranium is 238,07. But to a laymen uranium, the heaviest element, is 238 times heavier than hydrogen, the lightest, is more meaningful. When astronomers talk of 10^{23} stars in the universe it does not make any impression on me, as a soil scientist. But when Sir James Jeans said in his book, "The Mysterious Universe", there are more stars in the universe than all the sand grains in all the beaches of the world, I got an idea of the immensity of the number of stars in the universe.

Regarding, 5 Mg ha^{-1} as a unit of crop yield is understood by most agricultural scientists. But the same yield should be reported as 5 tonnes per hectare or even as 100 bushels per acre for laymen.

Non-specialists

Scientists often read papers by workers in other disciplines. If the paper is directed to such people, jargon should be avoided and the data and conclusions conveyed in simple but accurate language.

For example, if I were writing a paper on (Fe (III) - Fe (II) equilibria in submerged soils for physical chemists, I would use freely thermodynamic terms, such as standard free energy of formation (ΔG) activity coefficient (γ), and ionic strength (I). They convey accurately and concisely the substance of the paper better than wordy substitutes. But if I were writing a paper on iron toxicity in rice soils, instead saying $pH-\frac{1}{2}pFe = 5.4$, I would say that as pH decreases by one unit the concentration of water-soluble iron increase 100 times. This would enable an agronomist or plant

physiologist to realize that a pH change from 7.5 to 6.5 might spell the difference between iron deficiency and toxicity.

Practical users

This is perhaps the most important segment of the reader target. This group consists of technologists, teachers, extension officers, and lay users of scientific information. These people propagate scientific information in popular language or put new-found information to practical use. To this group the message must be clear and simple. For example, when we found that zinc deficiency was a cause of the low productivity of some Philippine rice soils, we wrote scientific papers in which factors such as activity product, pH, zinc/manganese, and zinc/iron ratios were involved. But our message to the extension workers was that if the soils were water-logged, or high in organic matter, or had a high pH, it was advisable to apply about 5 kg zinc sulphate per hectare for wetland rice.

Research sponsors

A paper prepared for research sponsors is called a Project Proposal. The two main ingredients of such a paper are the beginning and the end. The beginning of the paper describes the rationale or the need or justification of the project. The last section usually analyses the benefit of the project to the community. The middle section describes technical aspects without unnecessary details. It should have sufficient scientific detail for scrutiny by scientists of the field but at the same time it should be intelligible to economists and bankers who decide whether or not to give the money. Digits and units must be easy on the eye and be intelligible.

The lay public

The ordinary citizen is an important part of the reader target. If a sufficient number of them get excited about a scientific finding they can arouse sufficient interest among politicians to put it to practical use. To communicate scientific discoveries to the lay public, we need to use simple and clear language. Jargon and unnecessary detail are out of place.

For example, "At Eppawela, in the NCP, there exists a phosphate deposit that can supply the phosphate fertilizer needs of tea, rubber, and coconut for about 100 years" is more meaningful than "geological surveys have revealed the presence of a deposit 25 million tonnes of a mixture of chlor-, fluor, carbonate-, and hydroxy-, apatite which if beneficiated and acidulated can substitute for imported phosphate fertilizers".

DICTION

Diction is the choice of words and phrases in writing or speaking. Diction thus will cover language and style. Characteristics of good diction are : absence of errors of grammar, syntax, and idioms ; and the use of clear concise language.

This paper is not an exercise in grammar, syntax, or idioms but an attempt to list some ways to improve the quality of scientific writing.

Writing tips

1 Keep sentence below 25 words. People do not understand long sentences.

2 Use the active voice.

"Panabokke reported that ....." is shorter than

"It was reported by Panabokke, that ....",

"We can say ...." is simpler and shorter than

"It can be said that ..."

3 Short words are better than long words.

Examples

Instead of	Use
Necessitate	need
Parameters	factors
Eliminate	remove
Exterminate	destroy
terminate	end

But instead of	Use
occuring without external cause	Spontaneous

4 Avoid wordiness

Instead of	Use
dark green in colour	dark green
during all months of the year	every month
exerts a lethal effect on	kills
according to the information from the data	according to the data
in all cases	always

5 Numbers

i) Write out numbers below 10 except in a series containing some numbers higher than 10 or lower than 10.

Examples

Seven flasks

IFS has 3 directors and 20 scientists.

ii) Express time, money, and measurements in numbers.

Examples

4h, 5yr, Rs. 7.50, 8%

iii) Write all numbers when used to start sentences.

Examples

Eight insects crept into the cage.

Seventy five percent of the yield increase is due to fertilizer use.

DIGITS AND UNITS (See Annex)